

Appln. No. 09/976,668
Response to Office Action.... filed February 25, 2004

LISTING OF CLAIMS:

1. (Original) An ink jet printer comprising:

a printer case having a print area where printing upon a sheet is permitted and a nonprint area where printing upon a sheet is not permitted,

a carriage slideably mounted to said printer case so as to slide through said print area and said nonprint area of said printer case;

an ink cartridge mounted on said carriage;

a lever pivotably attached to said carriage for attaching and detaching the ink cartridge from said carriage, said lever being pivotable between an open position where the ink cartridge is detached from the carriage and a closed position where the ink cartridge is attached to the carriage; and

a lip attached to said printer case and positioned above said lever and within said print area for preventing said lever from detachment of said ink cartridge when said carriage is positioned within said print area, and for abutting said lever to prevent said carriage from moving from said nonprint area to said print area when said lever is in the open position.
2. (Original) The ink jet printer as claimed in claim 1, wherein said lip extends substantially along the length of said print area and has a gap formed therein.
3. (Original) The ink jet printer as claimed in claim 1, wherein said lip is formed integrally with said printer case.
4. (Original) An ink jet printer comprising;

a carriage slideably mounted to said printer case so as to slide along a print area;

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substantially U-shaped lever including a first arm having a first fixed end, a first free end and a first pivot point, a second arm having a second fixed end, a second free end and a second pivot point, and a tab connecting said first fixed end and said second fixed end, said lever being pivotably mounted to said carriage at said first pivot point and said second pivot point for pivoting about a pivoting axis defined as a line drawn between said first pivot point and said second pivot point; and

an ink cartridge detachably mounted to said carriage by said lever;

wherein, said lever being pivotable about the pivot axis between a first position where the lever engages an ink cartridge and a second position where the ink cartridge is attached to the carriage, and, wherein, pivoting of said lever between said first and second positions causes rotation displacement of the ink cartridge relative to said carriage.

5. (Original) The ink jet printer as claimed in claim 4, wherein said lever includes at least one resilient member for engaging said carriage when said lever is in the second position.

6. (Original) The ink jet printer as claimed in claim 4, further comprising a head mounted on said carriage having a connecting portion and wherein said carriage includes a mating portion for matingly engaging said connecting portion when said lever is in the second position.

7. (Original) The ink jet printer as claimed in claim 4, further comprising a needle attached to said head, and wherein said cartridge has an ink outlet and includes a seal for

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sealing said ink outlet, and said needle punctures said seal when said lever is in the second position to create fluid communication between said cartridge and said needle.

8. (Original) The ink jet printer of claim 4, wherein a discernible signal is produced by said lever when said lever is moved to the second position thereby signaling that the cartridge is in the attached position.

9. (Original) The ink jet printer of claim 4, wherein the pivoting axis is substantially parallel to the direction of the carriage movement.

10. (Original) The ink jet printer as claimed in claim 4, wherein said first arm includes a first resilient portion and said second arm includes a second resilient portion, said cartridge includes a first convex portion and a second convex portion formed thereon, and said first resilient portion engages said first convex portion and said second resilient portion engages said second convex portion to attach said ink cartridge to said carriage.

11. (Original) The ink jet printer as claimed in claim 10, wherein said first resilient portion has a first hole that engages said first convex portion of said ink cartridge and second resilient portion has a second hole that engages said second convex portion of said ink cartridge when said ink cartridge is in the attached position.

12. (Original) The ink jet printer as claimed in claim 4, comprising a first pin and a second pin attached to said ink cartridge on opposed sides of said cartridge so as to project outwardly from said sides said first arm having a first cam groove sized and shaped to accommodate said first pin and said second arm having a second groove sized and shaped to

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accommodate said second pin, said first and second cam grooves for guiding said cartridge to an attached position where said cartridge is attached to said carriage.

13. (Original) The ink jet printer as claimed in claim 12, wherein each of said first and second cam grooves has an opening exposed to accept said first and second pins when said lever is in the first position, said cam groove being shaped to guide said first and second pins and therefore said cartridge to the attached position when said lever is pivoted from the first position to the second position.

14. (Original) The ink jet printer as claimed in claim 12, wherein said first and second cam grooves each have an inside edge, said first and second cam grooves are shaped relative to said pivoting axis so that the distance between the inside edges of the grooves and said pivoting axis increases as said lever pivots from the first position to the second position to displace said cartridge toward said carriage to the attached position.

15. (Original) An ink jet printer, comprising:
a carriage which moves along a print area;
a head mounted on said carriage;
a U-shaped lever comprising first and second arms and a tab joining a first end of each arm, said lever being pivotably mounted on said carriage at a second end of at least one of said arms for pivoting about an axis extending between said second ends of said arms;
an ink cartridge mounted on said carriage at least in part by said lever; and
wherein each of said arms includes a resilient portion, said ink cartridge includes convex portions formed thereon, and each of said resilient portions engage a respective one of

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each of said convex portions to at least in part support said ink cartridge in said carriage moving direction.

16. (Original) The ink jet printer as claimed in claim 15, wherein said resilient portions have a hole that engages said convex portions of said ink cartridge when said ink cartridge is in said cartridge's mounted position.

17. (Original) An ink jet printer, comprising:

a carriage which moves along a print area;

a head mounted on said carriage;

a U-shaped lever comprising first and second arms and a tab joining a first end of each arm, said lever being pivotably mounted on said carriage at a second end of at least one of said arms for pivoting about an axis extending between said second ends of said arms; and

at least one of said arms including a resilient portion for engagement by said ink cartridge to support said ink cartridge in said ink cartridge on said carriage in a direction of movement of said carriage;

an ink cartridge mounted on said carriage at least in part by said lever, said ink cartridge being provided with a pair of pins projecting outwardly on opposed sides in said carriage moving direction, and each of said first and second arms includes a cam groove for receiving said pins for facilitating the mounting and demounting of the ink cartridge in said carriage.

18. The ink jet printer as claimed in claim 17, wherein each of said cam grooves has an opening exposed when said lever is in an open position, said cam grooves being shaped

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to guide said pins and therefore said cartridge to its mounted position when said lever is pivoted from said open position to a closed position.

19. The ink jet printer as claimed in claim 18, wherein said cam grooves are shaped relative to said axis of pivoting of said lever so that the distance between a point on the grooves and said axis of pivoting of said lever increases as said lever pivots from said open to said closed position to displace said cartridge toward said carriage to said cartridge's mounted position.

20. (Original) An ink jet printer, comprising:

a carriage which moves along a print area;

a head mounted on said carriage;

a U-shaped lever comprising first and second arms and a tab joining a first end of each arm, said lever being pivotably mounted on said carriage at a second end of at least one of said arms for pivoting about an axis extending between said second ends of said arms;

an ink cartridge mounted on said carriage at least in part by said lever; and

at least one of said arms including a resilient portion for engagement by said ink cartridge to support said ink cartridge in said ink cartridge on said carriage in a direction of movement of said carriage; said resilient portion assisting in reducing vibration of said carriage when said carriage is moving in said carriage moving direction.

21. (Original) An ink jet printer, comprising:

a printer case;

a carriage slideably mounted to said printer case;

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an ink cartridge having a first side including a first pin extending outwardly from said first side, and a second side including a second pin extending outwardly from said second side, said ink cartridge being attached to said carriage; and

a lever having a first arm, a second arm, and a tab connecting said first arm to said second arm, said first arm having a first groove sized to accept the first pin and said second arm having a second groove sized to accept the second pin when said lever is at a first position.

22. (Original) The ink jet printer of claim 21, wherein said first pin and said second pin move within said first and second grooves, respectively, to position said ink cartridge on said carriage as said lever pivots from the first position to a second position.

23. (Original) The ink jet printer of claim 21, wherein the carriage includes a supporting portion and said lever includes a stopper pin positioned to contact said supporting portion when said lever is in the first position to prevent said lever from overpivoting.

24. (New) An ink jet printer for use with an ink jet head having a nose portion through which ink is ejected, comprising:

a paper feeding path which guides a sheet of printing paper in a direction from a paper feeding side to a paper discharging side;

a paper feed roller having a peripheral surface coincident with a portion of said paper feeding path;

a driving device operatively coupled to said paper feed roller and selectively rotating said paper feed roller;

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a presser abutting said paper feed roller at a contact position, the contact position being located on said paper feeding path, so that when said paper feed roller is rotated by said driving device the sheet of printing paper is moved along said paper feeding path;

a flat paper guide surface disposed in said paper feeding path downstream of the contact position;

a printing area located between the flat paper guide surface and the ink jet head and corresponding to a region over which ink can be applied by ejection by the ink jet head;
and

a plurality of projections disposed on said paper guide surface, at least some of which said projections being at least in part disposed inside of the printing area which is located between the contact position where said presser abuts said feed roller and a position where the nose portion of the ink jet head opposes said paper guide surface across said paper feeding path when the ink jet head ejects ink, the projections being arranged at intervals in a direction approximately transverse to and beneath said printing paper for supporting the sheet of paper moving along said paper feeding path,

wherein said paper feeding path extending at least from the contact position of the presser to the printing area is substantially flat.

25. (New) An ink jet printer according to claim 24, wherein the presser comprises a pinch roller.

26. (New) An ink jet printer according to claim 24, further comprising a deflector located downstream of and apart from the contact position and which deflects the sheet of paper toward the projections.

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27. (New) An ink jet printer according to claim 26, wherein at least one of the presser, the deflector and the plurality of projections extends across a full width of the sheet of paper,

28. (New) An ink jet printer for use with an ink jet head having a nose portion through which ink is ejected, comprising:

a paper feeding path which guides a sheet of printing paper in a direction from a paper feeding side to a paper discharging side;

a paper feed roller having a peripheral surface coincident with a portion of said paper feeding path;

a driving device operatively coupled to said paper feed roller and selectively rotating said paper feed roller;

a presser abutting said paper feed roller at a contact position, the contact position being located on said paper feeding path, so that when said paper feed roller is rotated by said driving device the sheet of printing paper is moved along said paper feeding path;

a flat paper guide surface disposed in said paper feeding path downstream of the contact position; and

a plurality of projections disposed on said paper guide surface, at least some of which said projections are at least in part disposed inside of the printing area which is located between the contact position where said presser abuts said feed roller and the point where the nose portion of the ink jet head opposes said paper guide surface, the projections being arranged at intervals in a direction approximately transverse to and beneath said printing paper for supporting the sheet of paper moving along said paper feeding path,

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wherein said paper feeding path extending at least from the contact position of the presser to the printing area is substantially flat.

29. (New) An ink jet printer according to claim 28, wherein the presser comprises a pinch roller.

30. (New) An ink jet printer according to claim 28, further comprising a deflector located downstream of and apart from the contact position and which deflects the sheet of paper toward the projections.

31. (New) An ink jet printer according to claim 30, wherein at least one of the presser, the deflector and the plurality of projections extends across a full width of the sheet of paper.

32. (New) An ink jet printer for use with an ink jet head having a nose portion through which ink is ejected, comprising:

a paper feeding path which guides a sheet of printing paper in a direction from a paper source to a paper exhaust;

a paper feed roller having a peripheral surface coincident with a portion of said paper feeding path;

a driving device operatively coupled to said paper feed roller and selectively rotating said paper feed roller;

a presser abutting said paper feed roller at a contact position, the contact position being located on said paper feeding path, so that when said paper feed roller is rotated by said driving device the sheet of printing paper is moved toward said paper exhaust; and

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a flat paper guide surface disposed in said paper feeding path downstream of the contact position, the flat paper guide surface having a plurality of projections between the contact position and the paper exhaust beneath said paper feeding path for supporting the sheet of paper moving along said paper feeding path,

wherein said paper feeding path extending at least from the contact position of the presser to the printing area is substantially flat,

33. (New) An ink jet printer according to claim 32, wherein the presser comprises a pinch roller,

34. (New) An ink jet printer according to claim 32, further comprising a deflector located downstream of and apart from the contact position and which deflects the sheet of paper toward the projections,

35. (New) An ink jet printer according to claim 34, wherein at least one of the presser, the deflector and the plurality of projections extends across a full width of the sheet of paper,

36. (New) An ink jet printer for use with an ink jet head having a nose portion through which ink is ejected, comprising:

a paper feeding path which guides a sheet of printing paper in a direction from a paper feeding side to a paper discharging side;

a paper feed roller having a peripheral surface coincident with a portion of said paper feeding path;

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a driving device operatively coupled to said paper feed roller and selectively rotating said paper feed roller;

a presser abutting said paper feed roller at a contact position, the contact position being located on said paper feeding path, so that when said paper feed roller is rotated by said driving device the sheet of printing paper is moved along said paper feeding path;

a flat paper guide surface disposed in said paper feeding path downstream of the contact position;

a printing area located between the flat paper guide surface and the ink jet head and corresponding to a region over which ink can be applied by ejection by the ink jet head;
and

a plurality of projections disposed on said paper guide surface, at least one of which said projections is at least in part disposed within the printing area, at least some of the projections being arranged at intervals in a direction approximately transverse to said printing paper and beneath the sheet of paper moving along said paper feeding path.

wherein said paper feeding path extending at least from the contact position of the presser to the printing area is substantially flat.

37. (New) An ink jet printer for use with an ink jet head having a nose portion through which ink is ejected, comprising:

a paper feeding path which guides a sheet of printing paper in a direction from a paper feeding side to a paper discharging side;

a paper feed roller having a peripheral surface coincident with a portion of said paper feeding path;

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a driving device operatively coupled to said paper feed roller and selectively rotating said paper feed roller;

a presser abutting said paper feed roller at a contact position, the contact position being located on said paper feeding path, so that when said paper feed roller is rotated by said driving device the sheet of printing paper is moved along said paper feeding path;

a flat paper guide surface disposed in said paper feeding path downstream of the contact position ; and

a plurality of projections disposed on said paper guide surface, wherein at least a part of at least one of said projection is disposed outside of a region which is defined by the contact position where said presser abuts said feed roller and a point where the nose portion of the ink jet head opposes said paper guide surface when the ink jet head ejects ink, at least some of the projections being arranged at intervals in a direction approximately transverse to said printing paper and beneath the sheet of paper moving along said paper feeding path,

wherein said paper feeding path extending at least from the contact position of the presser to the printing area is substantially flat.

38. (New) An ink jet printer for use with an ink jet head having a nose portion through which ink is ejected, comprising:

a paper feeding path which guides a sheet of printing paper in a direction from a paper source to a paper exhaust;

a paper feed roller having a peripheral surface coincident with a portion of said paper feeding path;

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a driving device operatively coupled to said paper feed roller and selectively rotating said paper feed roller;

a presser abutting said paper feed roller at a contact position, the contact position being located on said paper feeding path, so that when said paper feed roller is rotated by said driving device the sheet of printing paper is moved toward said paper exhaust; and

a flat paper guide surface disposed in said paper feeding path downstream of the contact position, the flat paper guide surface having a plurality of projections at least some of which are disposed at least in part between the contact position and the paper exhaust and beneath the sheet of paper moving along said paper feeding path,

wherein said paper feeding path extending at least from the contact position of the presser to the printing area is substantially flat.

39. (New) An ink jet printer according to claim 24, wherein at least one of said projections extends from within the printing area to a point downstream and outside of the printing area.--